ENERGY VENTURES

FEDERAL BUILDINGS INITIATIVE

Managing Energy Performance Contracts In Federal Buildings

Part of the Efficiency and Alternative Energy Program

Un élément du Programme de l'efficacité énergétique et des énergies de remplacement

Natural Resources Canada
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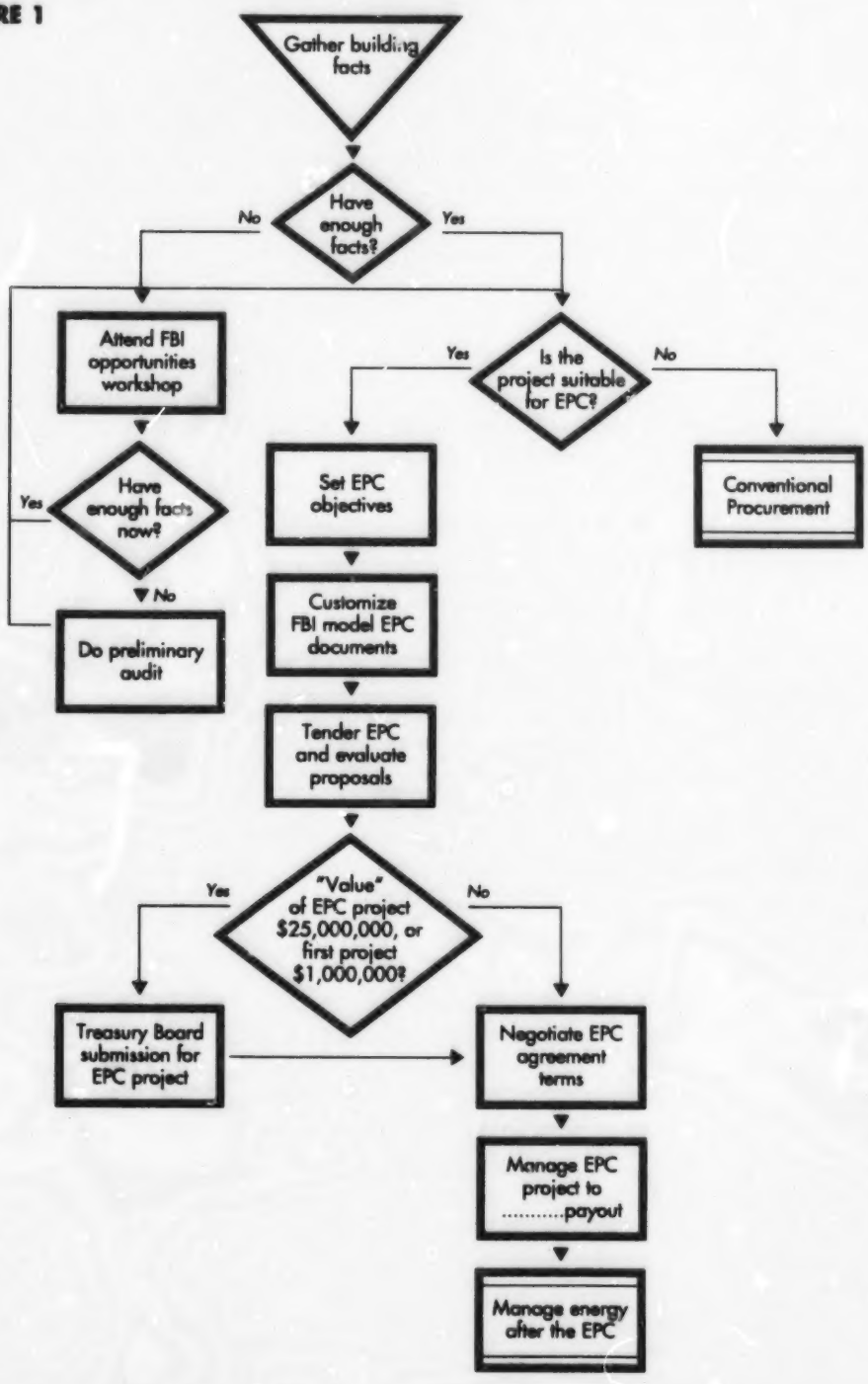
ENERGY MANAGEMENT PROCESS USING FBI OVERVIEW

FIGURE 1



1.0 EXECUTIVE SUMMARY

This document highlights the main issues and procedures that should be considered when implementing Energy Performance Contracting (EPC) in Federal buildings. As summarized in Figure 1, it discusses the following key areas, highlighting the Crown's responsibilities in each area:

- ***Choosing suitable buildings for EPC.*** The expertise of Crown staff or external specialists may be used to do a preliminary evaluation of which candidate buildings are suitable for EPC. A Preliminary Audit may be performed to gather facts to help in choosing the building. The choice of buildings suited to EPC must consider the plans for renovation or occupancy change, as well as the energy saving potential.
- ***Setting the EPC objectives for the building(s).*** This decision on the type of activities to undertake should involve all key persons responsible for management and operation of the building. The target length of agreement with an Energy Management Firm is a critical objective to establish. A commitment must be made to assign the proper person to manage the project for the Crown. This person must be able to obtain help from Crown staff for technical and financial review at key points through the life of the project.
- ***Calling For Proposals from qualified Energy Management Firms (EMFs).*** The FBI Model Request For Proposal (RFP) should be a starting point. Some customization may be appropriate depending on the size or scope of your project. The RFP should include a copy of the proposed Energy Management Service Contract developed by the Department from the FBI Model Contract. Bidders should be chosen from the FBI list of qualified Energy Ventures Allies. Bid evaluation for these projects is untraditional as monetary value is usually not simply defined, nor the only factor for consideration when developing a long-term arrangement for design, construction and training services. All parties to the final bid evaluation must be in agreement with the proposed scoring method before issuing the RFP. Also the time frames for tender closing and award must be established.
- ***Selecting the successful proposal.*** Before finalizing the selection of the successful EMF, interviews of project personnel should aim at determining whether good working relations can be expected. EPC projects depend on good working relationships between all parties because they involve long-term agreements on matters intimate to building operations.
- ***Treasury Board Approval*** is required for any project where annual energy cost times the payback term in years exceeds $25,000,000, or for a Department's first project where this figure exceeds $1,000,000.

- ***Awarding the Contract.*** Negotiation may be required on any variations proposed by the EMF to the Energy Services Agreement attached to the RFP.
- ***Once the Contract has been signed,*** the Crown's role shifts to monitoring and approving detailed changes to the building, and monitoring project performance in general. Savings and costs of the project are then the responsibility of the EMF. The Crown's responsibilities are basically:
  - ***Approval of Improvement Concepts and Detailed Designs*** presented by the Energy Management Firm. Though the EMF is responsible for savings success and cost control, the Crown has a keen interest in ensuring that building or operational changes will not impede building use or other operating costs.
  - ***Approving subtrades to be used by the EMF.*** Though subtrade management is the EMF's responsibility, the Crown should approve all sub-contractors considered for work on the building. The detailed schedule of work must also be acceptable to occupants and management staff.
  - ***Commissioning of retrofits and "Commencement" of the Payback Period.*** Though the EMF is responsible for ensuring that all retrofits work properly, the Crown should verify that equipment that was designed was actually supplied and is working as planned. The Crown's interest is that it will carry the cost of maintaining the equipment. Commissioning is also the point where equipment warranties normally start and maintenance responsibilities shift to the Crown. It is also the "Commencement Date," the beginning of the contracted Payback Period. As part of the Commissioning process, the Crown should ensure that staff are fully trained on new operating methods for the building.
  - ***Ongoing training of building staff.*** Training is vital to ensuring energy savings take place and remain in place. Though the EMF has a keen concern for well trained staff, when Crown staff changes are made through the life of a project the Crown must ensure new staff are trained to the level of departing staff.
  - ***Maintaining occupant support.*** Occupant awareness and involvement with the entire process is key to its success. They should be aware of the proposed changes to their space before Concepts for the Improvements are approved. As occupants observe the impact of the improvements on their space, their reactions should be carefully heeded and appropriate adjustments made if needed to maintain their support.
  - ***Monitoring project performance and routine contract review.*** This is an ongoing duty that diminishes as successful savings achievement becomes obvious from the first year's results. Though the EMF must demonstrate that savings have been achieved, the Crown needs to be familiar with the method

of savings proof. Building management must be aware of the project's performance relative to cost and savings targets, in order to properly administer the contract through its life. The EMF is likely to propose adjustments to the savings calculation method after any change in building use or occupancy. An annual review of key project performance terms is recommended.

- ***Maintaining the savings after the Energy Management Service Contract is complete.*** Once a building has been operating successfully at a new lower energy level for several years, equipment has been reset and people have adjusted to the new energy efficient operation. However, the Crown must put in place monitoring and training processes to ensure the operations continue as directed by the EMF. These processes may be similar to the services of the EMF in the final years of the contract.

Events which occur at any time during the life of a contract also require Crown attention:

- Notices of Irregularity
- Base Year Adjustments
- Concept and Design Changes
- New Measures After Construction
- Project Cost Payout
- Utility Price and Interest Rate Fluctuations

Issues which might arise through the life of a contract are presented in Section 11. These include Control of Building Operations, Savings Made By The Owner, Staff Changes, and understanding savings calculations.

This document does not take the place of the Energy Performance Contract or good judgement in any situation.

2.0 PURPOSE

This document is for federal property managers using Energy Performance Contracting (EPC) methods. It is presumed that readers of this document are already familiar with the concept of Energy Performance Contracting. Section 3 lists related materials which can provide background on EPC methods.

The purpose of this document is to prepare property managers and their supervisors for the details involved in this approach to modifying buildings. It aims to make property managers comfortable with EPC through awareness of the issues which typically arise throughout the life of any contract. With informed decision makers, the Crown will be better able to achieve its objectives. It is also advantageous for Energy Management Firms to have well informed clients with realistic expectations.

The document presents frank discussion of the issues to be considered in establishing and managing a mutually satisfactory arrangement with an Energy Management Firm (EMF). The document highlights areas where the Crown should focus its management effort. All other activities in a project can usually be left to the EMF without Crown management, due to the EMF's contractual commitment to project success.

The flow chart in Figure 1 summarizes the critical stages of a successful project. Detailed discussion of each step with related sub-steps are provided in Sections 4 through 11. Section 12 reviews key factors in maintaining the savings after the EPC agreement has ended.

Property manager decisions and actions in the most common types of situations are presented herein. Managerial judgement is needed to interpret these norms for each particular project. Ultimately, any differences of opinion between the EMF and the Crown must be resolved in light of the particular contract and its history. **This document cannot be construed to take the place of the Energy Performance Contract or good judgement in any situation.**

This document was prepared by Cowan Quality Buildings for the Canadian Association of Energy Service Companies, through a Contribution Agreement between the Association and Natural Resources Canada.

For more information about FBI or any of the support materials for EPC projects, contact the FBI Managers at Natural Resources Canada:

John Brennan, Chief FBI (613) 947-0380
Jean-Yves Letang, Program Officer (613) 995-6000
Nick McCartney, Program Officer (613) 947-1594

3.0 OTHER READING

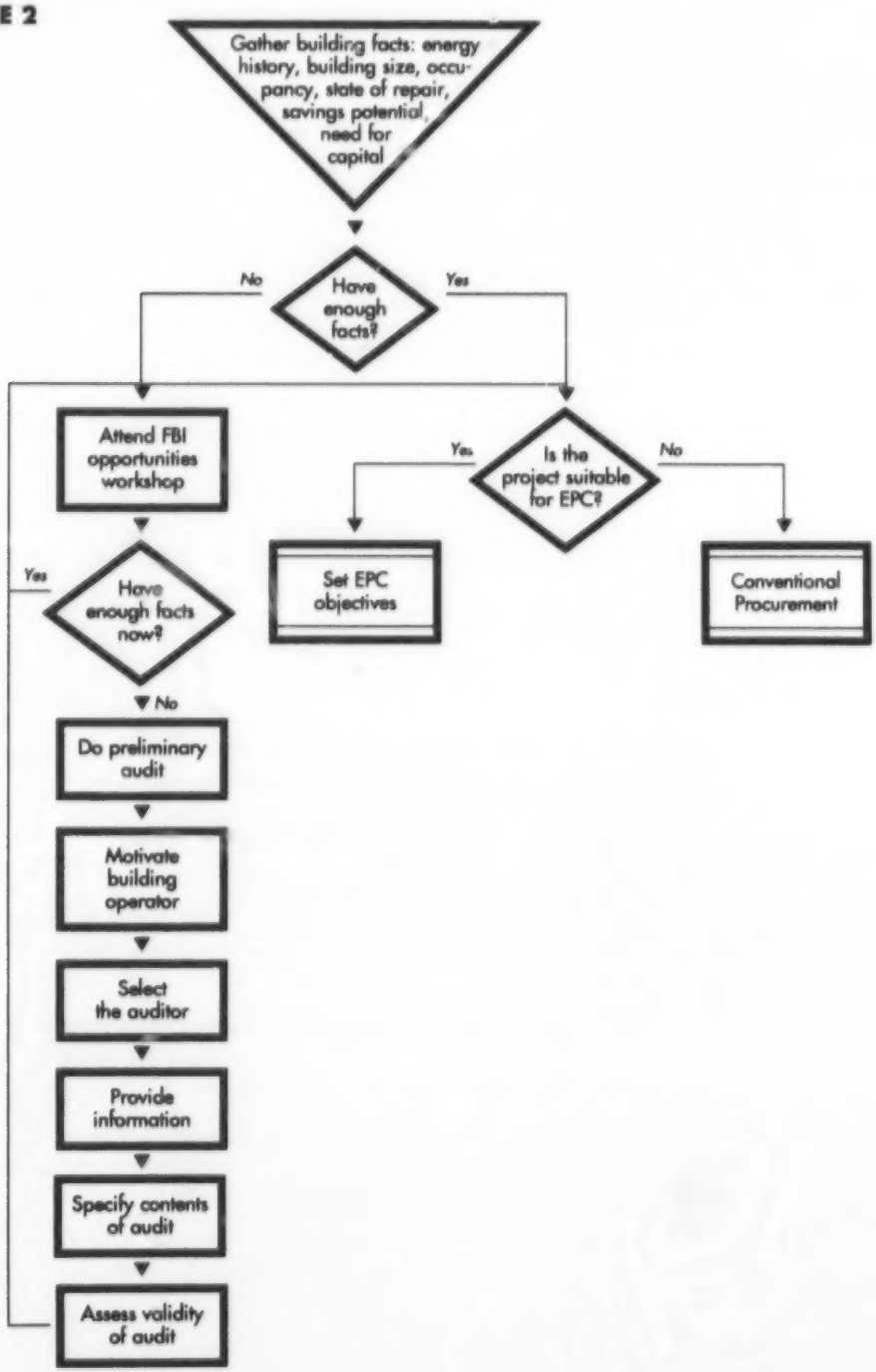
The *Federal Buildings Initiative "How To" Guide* provides background on concepts discussed herein. It is recommended as introductory reading for persons considering the use of EPC.

The Canadian Association of Energy Service Companies has prepared a videotape which provides easy background for persons unfamiliar with EPC. The Association has also published *Energy Performance Contract Guidelines*, providing useful detail on contract terms which may be used when customizing the FBI Model Contract for each project. These Association publications can be obtained from any member, or the Association's office at Suite 400, 1235 Bay Street, Toronto M5R 3K4 (416) 927-9098.

Health and Safety Guidelines For Energy Management Projects Under The Federal Buildings Initiative provides technical background on ways to harmonize indoor air quality and Energy Performance Contracting objectives. Its guidance should be considered by the Energy Management Firm and the Crown when developing the energy management concepts to be applied in each building.

CHOOSING BUILDINGS SUITABLE FOR EPC

FIGURE 2



4.0 CHOOSING THE BUILDINGS SUITABLE FOR EPC

Energy Performance Contracting (EPC) brings the following benefits to Crown owned buildings:

- access to the experience needed to make energy projects successful for the long run.
- a supply of manpower to manage the design, procurement, construction and commissioning of energy management ideas. Conventional means involving consultants and contractors would typically place much more administrative load on the Crown.
- a source of training to direct and motivate building operating staff on achieving results over a number of years.
- a source of capital to make the necessary investments.

Though the mechanism is non-conventional and can seem imposing, the guaranteed results available through EPC make it worthwhile because in the final analysis:

- buildings systems are renewed using new technologies.
- occupants have operating problems solved in the process of optimizing the building.
- building operating staff learn more about building operations and maintenance through regular contact with experts in long-run energy efficiency.
- net present worth to the Crown is higher than if conventional means had been used because:
  - savings are maximized by using a skilled and experienced team.
  - "opportunity costs" are minimized as savings are brought on stream quickly by the EMF.
  - savings are more likely to remain in place because staff have learned, through constant EMF surveillance, which factors are important to maintaining energy-efficient operations.

However, not all buildings are suitable for EPC. Also the nature and scope of each project must be individually tailored to suit the building. Though FBI has established a model form of EPC agreement, each contract must be set up to meet objectives which are appropriate to the building.

Much time and effort can be saved if the EPC path is planned carefully before beginning the process of calling for tenders and letting a contract. Figure 2 summarizes the process of choosing buildings suitable for EPC. Section 4.1 presents factors to consider in determining whether a building is suitable for EPC. Section 4.2 outlines a process of a Preliminary Audit to be used in the common situation of insufficient information available to answer the questions raised in Section 4.1. Following the review of important factors, and possibly a Preliminary Audit, the decision of whether a building is suitable for EPC can be made with criteria listed in Section 4.3.

4.1 Assess Available Facts About Buildings

EPC can be applied to most buildings. However those most suitable for EPC are those where:

- ***there are utility meter records that correspond to the building areas.***

  When only a portion of the area covered by a meter is to be addressed by EPC, special sub-metering must be installed to separate activities beyond the scope of the EPC project. This sub-meter data must be available for a period long enough to establish the base year for the part of the building not being addressed by EPC. Alternatively, the property manager must be prepared to accept a range of methods of proving savings without the comfort of correlation with the utility meter.

- ***it is expected that a wide ranging program of retrofits will be appropriate.***

  Most buildings present several opportunities for saving energy. An Energy Management Firm (EMF) can find the short payback retrofits that will help fund the desirable long payback measures for updating the building.

- ***the occupants use energy in a predictable fashion.***

  In some buildings normal operations involve energy intensive processes on an unpredictable schedule. Fish hatchery tank heating is just one example of major energy loads which operate in a fashion that is far beyond the influence or knowledge of an EMF. In a more mundane fashion, airplane hangar heating is largely driven by the number of times the doors are opened. In such situations the EMF will use sub-metering to protect the cash flow of the project from the impact of such variables. Alternatively, the EMF may propose to negotiate savings without reference to any meter.

- ***the facility is large enough to attract the interest of the type of contractor sought.***

  Small EMFs may be able to handle small buildings as they are experienced in low overhead projects. However, they may not have the resources to service all aspects of a large project, or may have to dedicate too much of their time to one large project.

Similarly small projects are inappropriate for full-service large firms whose methods are applicable to large projects. Several buildings might be assembled under one contract to spread the administrative overheads of the Crown and the EMF across a larger area.

No hard and fast definition of large and small is offered, as each situation must be assessed in light of the work expected and the background and experience of available EMFs.

- ***most building fabric or systems are in a good general state of repair.***

  Where an abnormal number of maintenance problems exist, it should be recognized that the EMF will have to fix these problems before being able to optimize energy use.

  Potential energy savings can finance deferred maintenance tasks, however, the payback may become excessively long. Also EMFs may be reluctant to predict savings as it is difficult to budget for the complications involved in fixing old maintenance problems.

- ***there are no plans to make major changes to the building or its occupancy in the foreseeable future.***

  If there are plans for major changes or additions, it should be recognized that the Energy Management Firm will need separate metering for any addition. Alternatively, the EMF will seek to negotiate the energy impact of the changes in order to protect the cash flow developed by the energy performance contract.

  The EMF may be able to provide some of the skills or financing for the major work. However, its focus on timely decisions and cost payback may be inconsistent with the customary design approach of the Crown for such renovations.

- ***there are significant savings to be realized.***

  A significant savings potential will be more attractive to an EMF than a slim savings potential. This is important because the project will be large enough that the EMF's fixed costs become a relatively small part of the total project cost.

- ***the required investment cannot be made out of regular capital or O&M budgets.***

  If all of the savings potential can be realized with an investment paying off within close to one year, outside funding methods are not needed.

- ***management effort is available to supervise the project.***

  The Crown must have staff or specialists available to look after its interests in the project. For example, the Crown must approve revised building operations concepts or changes to the base year for calculating savings. This management and

engineering time is far less than if the Crown designed and directed the energy management project in a conventional fashion. Nevertheless, the project needs a primary Crown contact person with the authority to make decisions and articulate needs of the Crown.

Former energy studies, combined with other operational or management information, may provide much of the above information to help determine the appropriateness of any building for EPC. It is important to have an up-to-date understanding of the potential savings. Department or PWGSC professional engineers or utility company energy advisers may be able to rapidly provide an adequate understanding of the potential savings after examining energy records of the latest year.

Where the above-listed information is already available, it may be adequate to skip the **Preliminary Audit** step in Section 4.2, proceeding directly to **Confirming the EPC Path**, Section 4.3. However, a comprehensive and current Preliminary Audit can provide useful support when seeking authorization to proceed with an EPC project.

4.1.1 FBI SELF-ASSESSMENT AUDIT

The FBI Self-Assessment Audit generated in the **Opportunities Workshop** will help building managers to identify the energy management opportunities in their buildings. From this Self-Assessment, a building manager may obtain enough information to move directly to confirm whether the building is suitable for EPC, Section 4.3, without conducting a Preliminary Audit.

Contact FBI Managers, Section 2.0, for more information about the location and time of Opportunities Workshops in your area.

4.2 Obtaining An Up-To-Date Preliminary Audit

If a Preliminary Audit is needed, it should at least address the issues listed in Section 4.1 above. It might go further to provide the information listed in Section 4.2.4, below.

Before beginning the Audit, current building operating personnel must be motivated to cooperate with the process as outlined in Section 4.2.1. The choice of person to perform the work is a balance between cost, quality, and adequacy, as discussed in Section 4.2.2. The information to gather before commissioning the work is identified in Section 4.2.3. Before paying for the Preliminary Audit, the results should be critically evaluated using the techniques suggested in Section 4.2.5.

The findings of the Preliminary Audit should help to establish some key parameters of the EPC project. These key parameters should be reflected in the Request For Proposal (see Section 6).

4.2.1 MOTIVATING THE BUILDING OPERATOR'S INVOLVEMENT IN THE AUDIT

Before beginning the Preliminary Audit, the building manager and operator should recognize that this is not an audit of individuals. They should appreciate it as an audit of the facility, its equipment and performance under current budgetary constraints. It aims to assess the opportunities for upgrading the building. It must be appreciated by building managers and staff that significant changes to buildings require knowledge, capital and time. These key ingredients have not usually been available for buildings under previous budgeting methods.

Staff must work with the auditor so that they can be in the forefront of updating their building. Skilful auditors and EMF personnel will ensure that staff participate fully in order to tap their familiarity with the building and obtain their help. Building operating and management staff should view this as an opportunity to finally achieve at least some of the things they may have wanted for years.

The site visit for the Preliminary Audit should be set up for a time when the key operating staff are available to guide the auditor.

4.2.2 SELECTING THE PRELIMINARY AUDITOR

The Preliminary Audit may be performed by a Department staff engineer, a PWGSC engineer, an Energy Management Firm, or an engineering consultant. In some areas, the FBI program has negotiated with the local utility for the supply of Preliminary Audits.

The bias of the auditor should be recognized before commissioning the Preliminary Audit. A utility will normally focus on the systems consuming its commodity, though they may endeavour to cover all systems. Similarly, a firm experienced in supplying and installing only one type of product may be weak in the other areas. Such biases may not be of concern where it is already clear that this is where the focus is needed.

A further consideration in selecting a focused auditor is to ensure that he or she understands the interactions of all building systems. For example, nearly all lighting retrofits will have an impact on heating, cooling and ventilation in a building. Without proper consideration for these interrelated systems, focused improvements have been proven to cause

operational problems. When choosing a potentially biased auditor it is important to ensure that he or she will draw on related expertise to address the interaction of focused system improvements with other building systems.

Where the scope of a potential project is not clear, the person or firm doing the Preliminary Audit should be equally versed in all technologies relevant to the building. This way no "blind spots" exist and system interactions will be properly treated. Engineers with mechanical and lighting system experience are typically required to provide this total view.

Where you are in some doubt about whether the building is suitable for EPC after reviewing Section 4.1, consider using an independent engineering firm for the Preliminary Audit, rather than an Energy Management Firm. EMFs offer Preliminary Audit services in anticipation of finding a viable project, possibly as a "loss leader." They do not usually simply wish to do audits for their own sake. Should they discover conditions which make the building unsuitable for EPC, they may cut their losses by doing a less than thorough Preliminary Audit.

The cost exposure of the Crown for the Preliminary Audit is highly variable. Some utilities or most EMFs offer free Preliminary Audits. Though such offers can be attractive, they should not detract from the need to meet the suggested specifications in Section 4.2.4. A basic guideline for the value of this effort is approximately 10 cents per square meter for single buildings greater than 10,000 m^2. Where smaller buildings are involved, the guideline might range up to 20 cents, as the time to analyze utility bills is independent of building size. Where multiple similar buildings are involved, the guideline might drop to 5 cents as less time will be spent during the walk-through part of the work. If this work is performed by staff at no cost, the basic guideline for the work effort should be no more than one to two personhours per 1,000 square meters of building area.

Some EMFs may offer a conditionally free Preliminary Audit. Such opportunities arise where the firm offers to waive partial or full charges for the service if implementation follows with their involvement. It should be recognized that such conditions may not be met if:

- the audit shows facts which may make implementation illogical, or
- in tendering the EPC project to a number of bidders, the one performing the conditionally free audit is not successful.

Therefore, contingent budget money should be available to pay for the Audit if the conditions are not met. Before commissioning a conditionally free Preliminary Audit, the terms of payment should be resolved. Payments might be spread over two fiscal years to ease their impact.

Most utilities offer some form of audit service, often free. However, cost penalties may apply if the suggested retrofits are not implemented within a specified time period.

4.2.3 INFORMATION NEEDED FOR THE PRELIMINARY AUDIT

To obtain a meaningful Preliminary Audit the following information should be supplied by the Crown:

- description of the facility's history, current occupancy, and future plans
- copies of at least the last 13 months' bills for all utilities. Water accounts may be included for consideration. The longer the period of utility history, the easier it is to identify operating anomalies, so 25 or 37 months' data may be helpful. Utilities may be able to provide computer printouts summarizing this billing detail for their commodity. The minimum required detail is meter reading date, consumption amount, cost, and billing demand for electrical accounts.
- known deferred maintenance projects, or major renovation plans
- recent building studies performed: air quality, maintenance condition, asbestos, updating plans
- list and description of the scope of all current building service contracts
- list of areas with special occupant requirements different from normal building standards
- list of energy management strategies particularly desired, or specifically not desired
- any available list of equipment sizes or capacities, as are often found in building plans or maintenance records
- a copy of the *Health and Safety Guidelines For Energy Management Projects Under The Federal Building Initiative*

The auditor will also wish to correlate recent operational or occupancy changes with the energy record, so you should expect to make operational records available for inspection.

The auditor may also wish to review mechanical and control drawings and specifications for the building. It may be necessary to lend these drawings and specifications to the auditor for the duration of the audit.

4.2.4 SUGGESTED CONTENTS OF A PRELIMINARY AUDIT

A Preliminary Audit covering the following points will provide the most assurance to the Crown that appropriate effort has been expended. By requiring the presentation of some data on standard forms such as the Appendices to this document, the Crown will be assisted in comparing key energy characteristics of all buildings which have been reviewed in a similar fashion. Such comparisons can help in early evaluation of the potential of a building, without the need to conduct a Preliminary Audit.

1) Complete the **Building Characteristics** form in Appendix 1 for the latest year.

2) Complete the **Current Energy Use** forms in Appendix 2.

3) Highlight any billing anomalies. Report any opportunities for lowering costs through changing the price schedule or contract terms used for purchasing the utility.

4) Compare the Appendix 2 Page 3 **Energy Indices** of this building with those of buildings with similar Appendix 1 characteristics. Describe the source of the data for comparison buildings, and when it was developed.

5) Estimate the **Components of Annual Energy Use and Cost** for each of the primary building services as shown in Appendix 3.

6) Present a proposed **Energy Budget** for this building on the form in Appendix 4. Compare this budget to other comparable buildings, describing the source and date of comparison data. Show the **Potential Savings** in energy and cost units for each utility type.

7) List the **activities** expected to be required to reach the Budget defined in 6. Identify the expected **collective simple payback period** from the activities, without specific definition of each. In estimating the overall payback period, include all necessary design, installation, commissioning, and initial training services associated with a conventional bid and specification approach. Make no allowances for other project support costs which may be included in an EPC project.

Describe the **engineering** needed to achieve the energy Budget.

8) Describe the operations staff **training** needed, beyond the initial training on the improvements, in order to achieve the energy Budget.

9) Note any areas where observance of the *Health and Safety Guidelines for Energy Management Projects Under the FBI* may cause difficulties. The guidelines highlight regulations and good practices relevant to energy management projects.

10) Identify any operating or maintenance **problems or equipment deficiencies**. Also describe any **planned changes** to the building or its occupancy pattern.

11) Describe any **difficulties in using the utility meters** as a basis for proving savings.

4.2.5. ASSESSING THE PRELIMINARY AUDIT

Regardless of the size of the Preliminary Audit, it should be critically assessed. The possibility of bias or error should be examined by asking yourself the following questions:

- How valid are the audit's comparisons with other buildings? Are the buildings comparable?
- How does the budgeted energy use compare with the current use of other comparable buildings under your control? Do you have budget numbers for any of them to compare with the proposed budget for this building. If the comparisons are from comparable buildings and they appear plausible, then the quoted savings potential is probably realistic.
- Watch for signs of the audit not pressing to the limits of modern technology:
  - current use of any single utility is close to the energy budget, yet you know that your building has not received any significant updating
  - little fuel savings potential though you know that occupant comfort has been a problem for several years. Discomforts are usually symptoms of systems being out of balance, therefore wasting energy.
- Does the audit address all utility types? If the potential savings of one utility are trivial compared to another, is it really true that there are few savings in this area? Maybe the auditor's bias is showing through.
- Does the list of energy management activities reflect a bias to one type of technology (e.g., lighting) or one type of equipment (e.g., control system)?
- Does the list of activities suggest that the interaction effects of one system on another are considered as part of the necessary work?
- Have operating problems and health and safety matters been addressed?

These questions may be put to the auditor to satisfy yourself of the validity of the audit.

4.3 Confirming The EPC Path

Presuming that adequate preliminary information is available (Section 4.1), or a valid Preliminary Audit was performed (Section 4.2), you are ready to confirm the decision to proceed with EPC.

EPC is appropriate when *any* of the following conditions are met:

a) **The estimated overall simple payback period is between two and about five years.** Conventionally procured goods and services are unlikely to be financed beyond two fiscal years by most suppliers. EMFs cannot undertake projects with an overall simple payback longer than about five years because interest, monitoring and project management costs will bring the project length beyond the maximum eight-year payback period allowed by Treasury Board for FBI projects. This upper limit is affected by interest rates, and EMF management and service fees.

b) **The suggested improvements are complex.** A complex group of improvements cannot be properly implemented by a single equipment supplier. The management capacity and experience of an EMF are appropriate to ensure that design construction and operation are properly integrated.

c) **Operational changes are important to achieving ongoing efficiency.** When savings are dependent on operating methods, the project needs the training services and total utility performance responsibility offered by an EMF.

If *none* of these conditions is met, you should consider proceeding with conventional methods of implementing energy management ideas, financed on fixed repayment terms by the supplier to match your fiscal periods.

When potential savings are small, it may be difficult to attract the interest of an EMF. Several buildings might be grouped into one project to make a project of sufficient interest to EMFs. You should interview EMFs to determine their minimum project size to help you in this regard. The Fact Sheets supplied for Energy Ventures Allies[1] provide a sense of the size of each EMF. Small firms may be more willing to conduct small EPC projects than large firms. Your choice of EMFs may be limited if your EPC project is deemed "small" by the industry in your area. If the potential savings are over $100,000/year, you should have no difficulty in finding EMFs willing to consider your project in most parts of the country.

You should also expect to spend time initiating and managing the project. You should also expect building staff to spend time in training and in creating awareness amongst building occupants. Though EPC is designed to provide all services needed by the Crown to achieve energy efficiency, the Crown must still be prepared to supervise the project.

[1] *Energy Ventures Allies: Company Profiles* are available from the Canada Communications Group by fax at (819) 994-1498. Order Publication number M92-70/1993. Check with FBI managers at NRCan, Section 2.0, to determine whether your copy of the *Company Profiles* contains all currently qualified firms.

5.0 SETTING EPC OBJECTIVES FOR THE BUILDING

Before soliciting proposals from Energy Management Firms, everyone who will be involved in the project should participate in setting its objectives. This will include the building manager, chief operator, maintenance manager, tenant or occupant representative, and the EPC project administrator.

Objectives should be set in the following areas:

- length of contract
- amount of risk to be borne by the EMF
- measures to be included for sure, or excluded for sure
- type of EMF appropriate for the project.
- staff commitment to administer the project

The issues likely to arise in each of these areas are discussed in Sections 5.1 through 5.5.

Determine desirable contract length
Determine amount of risk to be borne by EMF
List desirable and undesirable improvements
Determine type of suitable EMF
Appoint project manager

5.1 Length of Payback Period

The expected payback presented in the Preliminary Audit is a guide to the length of payback period to be allowed by the contract. Consideration must be given to several factors beyond the simple payback suggested by the Preliminary Audit. These factors are:

- interest needed to finance the investment
- special premium for the risks assumed by the EMF in their retirement of project costs
- ongoing support and training over a number of years to maintain and identify savings
- project management fees charged by the EMF to take care of all matters of project coordination

These are the costs associated with obtaining a packaged product that is guaranteed to produce savings. Though these factors may look imposing and may significantly extend the payback period, the alternative to not paying for these extra services is the conventional do-it-yourself approach, involving delays and uncertain success. The focus and experience of the EMF will normally make the ultimate performance of an EPC project more attractive than the do-it-yourself approach. In fact, since the conventional method has always been available, the fact that there are still savings to be secured highlights the delays associated with conventional methods. Every year of delay is a year of savings lost forever.

The impact of these factors varies from project to project, EMF to EMF, and as interest rates vary. It is therefore difficult to suggest a specific allowance to make in setting contract length suited to the estimated simple payback period. However, as an example, consider the case of a $1,000,000 project with a 4.25 year simple payback, or $236,000/year savings. This example project would cost the Crown $1,000,000 in the do-it-yourself method, covering audit, design, commissioning, training, and contractor costs with markups. No provision is made for owner staff time in managing the work. Assuming the same basic project is developed by an EMF, the following further typical costs are carried by the EMF on behalf of the Crown:

$430,000 **Interest**, assuming financing at 9% over the life of the project

$100,000 **Performance Guarantee** which reassures the Crown that no matter how well the savings proceed, the EMF will have no claim beyond the savings. This guarantee also provides some reassurance that by the end of the Contract the savings turned over to the Crown will be as high as humanly possible.

$50,000 **Inspection and training over the life of the contract.** Periodic visits are needed to allow the EMF to examine the building and meet operational staff. Some of the visits may be through computer inspection of the computer control system. This continual contact is what ensures that initially achieved savings are maintained.

$50,000 **Project Management** from the audit through the design and construction stage to the end of the payback period.

$20,000 **Utility Bill Analysis.** For seven years the bills must be analyzed to prove to all that performance is on track, and to act as the basis for invoicing.

Notice that this example project has no special EMF markup for overhead and profit, since such is usually similar to the contractors' markups that would be charged in the do-it-yourself case.

The savings stream must support a real total project cost of $1,650,000. The payback term is seven years. The EMF may wish to have a slightly longer contract term to reduce its risk.

This example project shows that the EPC payback term, paying all real costs, is 65% longer than the do-it-yourself approach. The do-it-yourself approach ignores the extra costs which would be separately absorbed by the Crown.

This is one typical project. Given the many factors affecting these project overheads, the actual **contract length should be expected to be between 50% and 100% greater than the simple payback period established in the Preliminary Audit.**

The final contract length for your project should be a period of time that is comfortable to you, and within the Treasury Board limit of eight years. Setting this length sets the "hurdle rate" for all subsequent activities.

5.2 Amount Of Risk To Be Borne By The EMF

Some improvements have more certain energy results than others. If the Preliminary Audit identifies improvements which are dominated by ones where the savings are proven by simple one-time tests, not needing to rely on utility meters, the project may be configured without the need to monitor and "service" the project for several years.

For example, a change to the installed electrical load for lights or motors, with no change to their operating periods, would only require a simple one-time measurement to prove performance. Once the savings have been demonstrated, there is little reason to maintain a complex agreement for savings maintenance and proving, with its associated cost burden against savings. However, since financing must remain in place, the RFP should explicitly seek propositions addressing:

- the savings proof method
- the absence of monitoring services
- a reduction of the normal risk premium charges because of the lower risk to the EMF.

5.3 Desirable and Undesirable Improvements

Some of the energy management activities mentioned in the Preliminary Audit may be very attractive to you for reasons other than energy. For example, the changing of light fixtures may deal with the growing problem you face of replacing burned-out ballasts. You may want to specify that certain measures be implemented, regardless of final economic evaluation by the winning EMF. However, use caution in adding extra burden to the project as it must stay within the maximum eight-year payback term established by the Treasury Board.

Similarly, some activities may be incompatible with your other plans for the building. For example, a revision of lighting and or HVAC equipment may be inappropriate in a portion of the building where occupant activities are expected to change significantly in the near future. In this event you would specify in the RFP that this area is to be excluded from any initial improvement plans.

In reviewing the Preliminary Audit, it may become apparent that some measures have a much shorter payback period than the rest. It is therefore tempting to focus the program on just these measures in order to make a shorter project. However, there are several impacts of selecting only the fast payback measures:

a) The abandoned longer payback measures are isolated. The resultant long payback residual savings may never be achieved because they are inadequate to justify their cost. The savings earned by the original fast payback measures get absorbed into operations and are no longer available to fund energy investments.

b) Proper engineering to coordinate the interaction of all building systems may be missed.

c) Implementation costs of the chosen and rejected measures may go up due to the smaller scale of each project.

d) The savings estimates for all measures may change as a result of a revised order of implementation. This factor should be considered by the engineer who performed the Preliminary Audit.

5.4 Type of EMF

If the project features one improvement, e.g., change to high-efficiency lighting, a full-service Energy Management Firm is unnecessary. An EMF focused on this type of improvement may achieve the results more cost effectively than an EMF structured to address all possible retrofits. The Energy Ventures Allies Fact Sheets provide useful information on the capabilities of each EMF. Before finalizing the bidders list, ensure that you have an up-to-date version of the Fact Sheets by calling an FBI Manager at Natural Resources Canada (see Section 2.0).

Where an EMF is focused on one type of building modification, it is important to ensure the firm is aware of and capable of addressing the impact of their work on other building systems.

The bidders list should contain firms in your area capable of the type of work you envisage.

5.5 Project Management Staffing

Though EPC places much less burden on Crown staff compared to conventional procurement methods, some time must still be allowed for setting up and administering the contract. If such time commitments cannot be made, no energy management project will be successful. Neither EPC nor conventional procurement should be attempted.

This time requirement is heaviest at the initial stages of tendering and design.

EMF relations should be handled by a person high enough in the organization to be able to call in engineering help for brief periods to review plans, designs, commissioning reports, and statements of savings proof. He or she should also have access to contract management and legal advice for this non-standard form of contracting. The duties of this person are more fully spelled out in Sections 6 through 11.

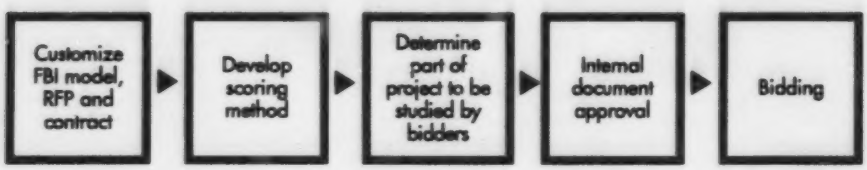
Public Works and Government Services Canada offers a service to assist federal government departments in managing their EPC projects. (See Chapter 6 of the FBI "How To" Guide.) Private consultants are also available to guide a department's procurement and management activity. (Contact FBI Managers at Natural Resources Canada, see Section 2.0.)

6.0 CALLING FOR PROPOSALS

With the setting of EPC Objectives as discussed in Section 5, the project is ready to be turned over to an Energy Management Firm.

A Request For Proposal should be developed along with a Contract for Energy Management Services, using the FBI model documents as a guide.

Section 6.1 summarizes steps involved in customizing the model documents. Section 6.2 describes an appropriate final internal review process before tendering. Suitable procedures for the bidding process are discussed in Section 6.3.


Customize FBI model, RFP and contract
Develop scoring method
Determine part of project to be studied by bidders
Internal document approval
Bidding

6.1 Customizing FBI Model Documents

The FBI has prepared model RFP and contract documents. They are available on diskette. You can obtain a copy from an FBI manager (see Section 2.0). These models should be customized to suit the needs of the particular project and department involved.

The contract should be included with the RFP so that all the terms of the contract are seen before tenders are submitted. The contract should be drafted by the Crown, rather than using an EMF contract. Most EMFs are generally familiar with the standard FBI model contract.

Department financial and legal staff should become familiar with the model documents at this stage, if they have not already been so exposed. Their input on the specific changes for this project should be obtained at this point. Assistance can also be obtained from FBI managers (Section 2.0) or independent consultants.

The FBI *"How To" Guide*, and the *Energy Performance Contract Guidelines* produced by the Canadian Association of Energy Service Companies summarize issues to be considered in finalizing the RFP. There are numerous blanks in the model documents requiring completion to suit the specific needs of the project and department. Further significant consideration should also be given to the scoring method for proposal evaluation, and to the portion of the project to be studied by the bidders (see Sections 6.1.1 and 6.1.2, respectively).

The RFP should also enclose a copy of the Preliminary Audit, along with any recent studies or analyses of maintenance or operations. Any specific retrofits to be included or excluded should also be highlighted (see Section 5.3, above). Special operating requirements, non-standard requirements for space conditions or other restrictions should be mentioned in the RFP. The target payback period and any expectations regarding sharing of risk should also be presented (see Sections 5.1 and 5.2 above).

6.1.1 SCORING METHOD FOR PROPOSALS

The FBI model RFP suggests a scoring method for evaluating information supplied in proposals. You should review the scoring weights in the model to ensure they are consistent with your wishes.

An important consideration is the amount of emphasis to place on the details supplied by bidders on the retrofits they propose. You can expect that the proposals from the different EMFs will be quite different in both the savings and cost they propose and the type of improvements proposed. This difference arises as there is no textbook method for determining appropriate measures or for estimating savings. Though there may be common elements in the proposals, there will probably be a wide variation, making evaluation difficult.

The fact that a firm is on the FBI list of Energy Ventures Allies does not ensure that its skills suit the wide range of all possible FBI projects. Each bidder's skills must be evaluated closely to verify that they suit the particular project.

Time for both bid preparation and proposal evaluation can be shortened by placing scoring emphasis on EMF qualifications and general procedures as well as on the attention paid to your stated concerns, rather than on specific proposed measures.

It should be recognized that, after contract signing and the completion of engineering, it is very likely that the improvements presented in the proposal will need to be altered. Such changes arise because improvement finalization requires consideration of many more factors than can normally be considered while preparing a speculative proposal. You may even be able to ask the selected EMF to modify measures to reflect ideas from other proposals. The selected EMF will be happy to know what interests you, and will be willing to make modifications if they do not change the risk or scope.

Therefore scoring should favour the EMF with the best expertise and approach for your project. Then, if the EMF later advises that a change you propose is not viable, you will be confident that the advice is relevant to your building.

When considering the scoring method to apply, it should be recognized that improvement measures may change as engineering is completed. Prices will have to change as measures change. Therefore the price **structure** for making cost adjustments is more important than any specific price mentioned in the proposal.

As the EMF will act as your purchasing agent, the procurement capabilities of each EMF should also be given some emphasis.

6.1.2 PORTION OF THE PROJECT TO BE STUDIED BY BIDDERS

For large facilities, it may not be practical to ask bidders to examine all of the space, even though the contract may cover all of it. When bidders are asked to present a list of improvements, the size of the task should be considered. EMF consideration of a portion of the project may give the Crown enough insight into the type of improvements a bidder will implement throughout, while curtailing EMF proposal preparation costs.

When only part of the facility is considered for the proposal, consideration needs to be given to methods of later verifying whether savings predicted in the proposal have been met. To meet this requirement for isolating savings, the section of the facility presented for initial analysis should have utility metering separate from the rest of the facility.

6.2 Internal Approval of Tendering Documents

The documents planned for tendering must be understood and accepted by everyone responsible for such work within your department. These people should be provided with a copy of the documents, highlighted where they are different from either the FBI model or previously approved documents.

It is important to ensure that the decision-making process for EPC projects has been well defined at this stage so that there are no undue delays later.

For your first EPC project, care should be used to ensure that all parties with an interest have been informed or involved appropriately.

6.3 Bidding Procedures

The RFP and attachments should be issued to at least three EMFs on the list of qualified Energy Ventures Allies which is kept current by the FBI. In maintaining this list, the FBI has evaluated the firms in the following areas:

- experience in designing and implementing energy efficiency improvement projects, including a minimum two years experience for involved personnel
- financial stability and contract capability
- utility affiliations, insurance and bonding capabilities

Select bidders using the following EMF characteristics listed in the NRCan binder entitled *Energy Ventures Allies: Company Profiles*:

- qualified to do business in your province
- financing capacity for a project of this size
- skilled and experienced in the size and type of work you expect to be included

Tendering should follow the normal full procedures of your department for interpreting the RFP and communicating with invited bidders.

Following release of the RFP, a bidders meeting should be called to answer any general questions. Though a brief site orientation tour may be arranged for bidders at this time, it is to be expected that each EMF will have a different strategy for site inspections. Certainly, each will want a private tour so that its competition does not detect its areas of interest. The bidders meeting should include discussion of ways to arrange such private tours.

The amount of time to allow for preparation of proposals depends on the complexity and size of the project, and the scope of your requirements of bidders (see Section 6.1.2). If a full listing of final measures is expected, more time will be required than if less detail is requested. A minimum period of time for a small project would be forty days. Two months would be better. If a large project is involved with many details required in the proposal, three to four months may be needed.

The North American Free Trade Agreement (NAFTA) requires that all service contracts valued at more than $67,300 allow 40 days for response to a Request For Proposal.

7.0 SELECTING THE WINNING PROPOSAL

Though departments may use the FBI list of qualified Energy Ventures Allies to invite proposals, the selection of a suitable competent EMF is still the entire responsibility of the department. As there is usually no simple number such as price to compare proposals, evaluation must be based on a number of less quantifiable factors. Evaluation criteria should be established at the time of developing the RFP (see Section 6.1.1.).

A proposal review committee should be formed which consists of all the key individuals who will be involved in administration of the contract. You may also wish to consult a financial analyst and a lawyer within your department, the Treasury Board analyst, the Director of Accommodation, and the Director of Technical Services. For your first EPC project you may wish the assistance of an independent consultant in this field. Call an FBI Manager for direction (see Section 2.0).

In reviewing proposed measures and savings, it should be realized that as engineering progresses, the definition of measures will be refined. Some measures may need to be dropped while others are added. Such changes are the nature of designing modifications to many interrelated systems which cannot be fully assessed in the brief time available for a speculative proposal.

It is possible that an EMF may offer an optional form of savings sharing to that contained in the contract attached to the RFP. Any such optional scheme should be evaluated for its present value to the Crown. It should also be evaluated to ensure there is no loss of motivation for either party to control project costs or to maximize savings at all stages of the contract.

The ability of the EMF to procure goods and services at a competitive price is central to its ability to maximize savings to be earned within a fixed contract length. Proposals should be reviewed particularly closely regarding purchasing and subcontracting policies. Charges to the project before markup should be expected to be comparable to those paid by any general contractor for its materials and subtrades.

Where the EMF is also a supplier of goods or services likely to be used in construction of the project, or has a corporate interest in such firm, there is an opportunity for the project to receive particularly competitive pricing, depending on the EMF's policies.

7.1 Pre-Selection Interview

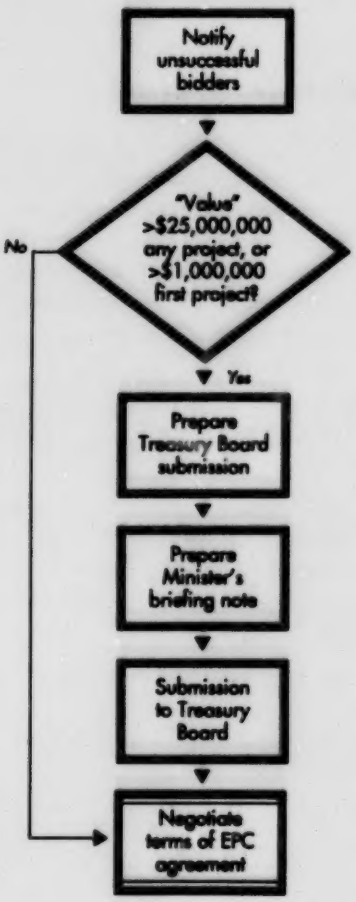
Before final selection of the winning EMF, it is suggested that the evaluation committee meet with at least the first-choice bidder. The top two or three may be interviewed if necessary. Skills of project team members and the personal chemistry with Crown staff are important to a successful project. Therefore, this meeting should specifically focus on understanding the individuals who would be assigned to the project. Plan at least one hour for each meeting, plus any time you feel may be needed to answer questions about the proposal. You might also plan for your project administrator to visit the EMF's office to meet other staff, before final selection.

In this interview process, ask the EMF's project manager and project engineer (if they are two separate individuals) to attend and be prepared to speak about their experience in general as well as specific ideas for your project. Technical persons on your committee should ask questions about typical or hypothetical improvement ideas and how they would be handled. The committee should also ask questions about subcontracting procedures and project reporting methods. From the free-format discussions of this interview process you should assess the experience and preparedness of the individuals, rather than determining whether the answer was right or wrong.

After this interview process you should be ready to select the EMF for your project.

AWARDING THE CONTRACT

FIGURE 3



8.0 AWARDING THE CONTRACT

Though final selection of the winning proposal may be complete, as described in Section 7, the project does not begin until the contract is signed. Sections 8.1 through 8.3 review the steps in final contract arrangements.

- notifying unsuccessful bidders
- Treasury Board approval for first project or large projects
- negotiation of contract details with internal approvals

During final negotiations and the contract award stage, the EMF may be anxious to begin the detailed study. Such advance work might accelerate the realization of savings and benefits. Consult with your legal department before signing any letter of intent. Also ensure that the results of all preliminary work will be surrendered to the Crown if a contract is not awarded. It is also necessary to verify that funds are available to pay for any aborted work should the contract not be signed.

8.1 Notifying Unsuccessful Bidders

Unsuccessful bidders should be notified as soon as possible after committee selection of the top ranked proposal.

You may have to turn to your second ranked firm if negotiations with your first choice fail. The wording of the notification to unsuccessful bidders should therefore be approved by your legal department.

8.2 Treasury Board Approval

Treasury Board (TB) approval is required for a department's first contract or any large energy performance contract. The TB requires that the first project with "value" in excess of $1,000,000, or any with "value" in excess of $25,000,000, must be approved. "Value" is defined as the product of the base year energy cost and the length of the contract payback period in years.

For example:
If current energy cost is $200,000 per year, and a six-year payback period is planned,
Then the "value" assigned to the project is 6 x $200,000 = $1,200,000.

In this example TB approval would be needed only if this were the department's first project.

If approval is required, follow the steps in Sections 8.2.1 through 8.2.3.

8.2.1 PREPARE TREASURY BOARD SUBMISSION

The FBI has prepared a model TB submission. Contact an FBI manager at Natural Resources Canada to obtain a copy (see Section 2.0).

You should notify your TB analyst of the nature and timing of the submission. Your financial staff can locate the TB Program Branch Analyst responsible for your economic sector and department.

Financial personnel in your department should review the draft submission. It should also be reviewed by any personnel in your department appointed as liaison to the TB Program Branch.

8.2.2 PREPARE MINISTER'S BRIEFING NOTE

As your Minister's signature is required for the submission, a short Minister's briefing note must be prepared. This note should explain the reasons for seeking TB approval under the FBI. If the Minister and staff are not conversant with FBI and EPC, further time must be spent to educate them on this matter before seeking the signature.

8.2.3 TREASURY BOARD SUBMISSION

Assemble the TB submission with the Minister's approval and submit it to the TB analyst.

Ensure that it is on the agenda of the next possible TB meeting. As priority matters may force rescheduling of your submission, keep in touch with the TB analyst regarding the status of your submission. During the summer the TB meets only once every two months.

Following the TB meeting, try to obtain verbal confirmation of approval, as it could take up to a month for written approval.

8.3 Negotiate Contract Details

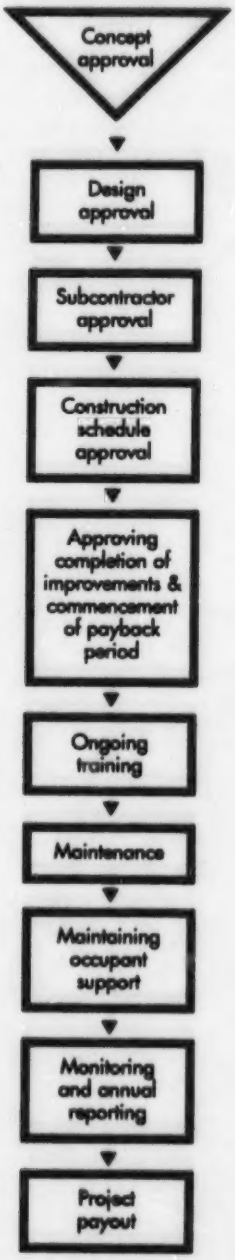
As a draft contract should have been part of the RFP, there should be few changes in contract details. However, the EMF may have proposed adjustments which you find attractive.

Following Treasury Board approval, if required, begin negotiations on the final form of the contract, after completing all blank sections. Obtain the advice of lawyers in your department as appropriate for any adjustments proposed by the EMF. Your lawyer may contact a lawyer at Natural Resources Canada for guidance on these matters.

Ensure that the individuals negotiating the contract have the appropriate authority.

CROWN RESPONSIBILITIES DURING THE EPC PROJECT

FIGURE 4



9.0 CROWN RESPONSIBILITIES DURING THE EPC PROJECT

After contract signing, most activity is conducted by the EMF. However, the Crown must remain involved for approval at the key points of:

Concept Approval
Design Approval
Subcontractor Approval
Construction Schedule Approval
Completion of Improvements:
Commencement of Payback Period
Ongoing Training
Maintenance
Maintaining Occupant Support
Monitoring and Annual Reporting
Project Payout

Each of these points is discussed in Sections 9.1 through 9.10.

Regardless of the sequence of events undertaken by the EMF, the Crown will remain in control of the project through its right to approve concepts, designs, completion of measures, and savings claims.

Events requiring Crown attention and which may occur at any time during the life of a contract are: Notices of Irregularity, Base Year Adjustments, Concept Changes, Design Changes, New Measures After Construction, Project Cost Payout, Utility Price Fluctuations, and Interest Rate Fluctuations. These Events are discussed in Section 10.

Issues which might arise through the duration of a contract are presented in Section 11. These include Control of Building Operations, Owner Savings, and Staff Changes.

The Crown is required to approve or object to matters promptly, because delays represent lost savings which have a real value to the EMF. The model contract assumes approval is granted if no response is provided within a specified time period. Therefore, the department should be prepared to quickly respond to EMF requests for approval.

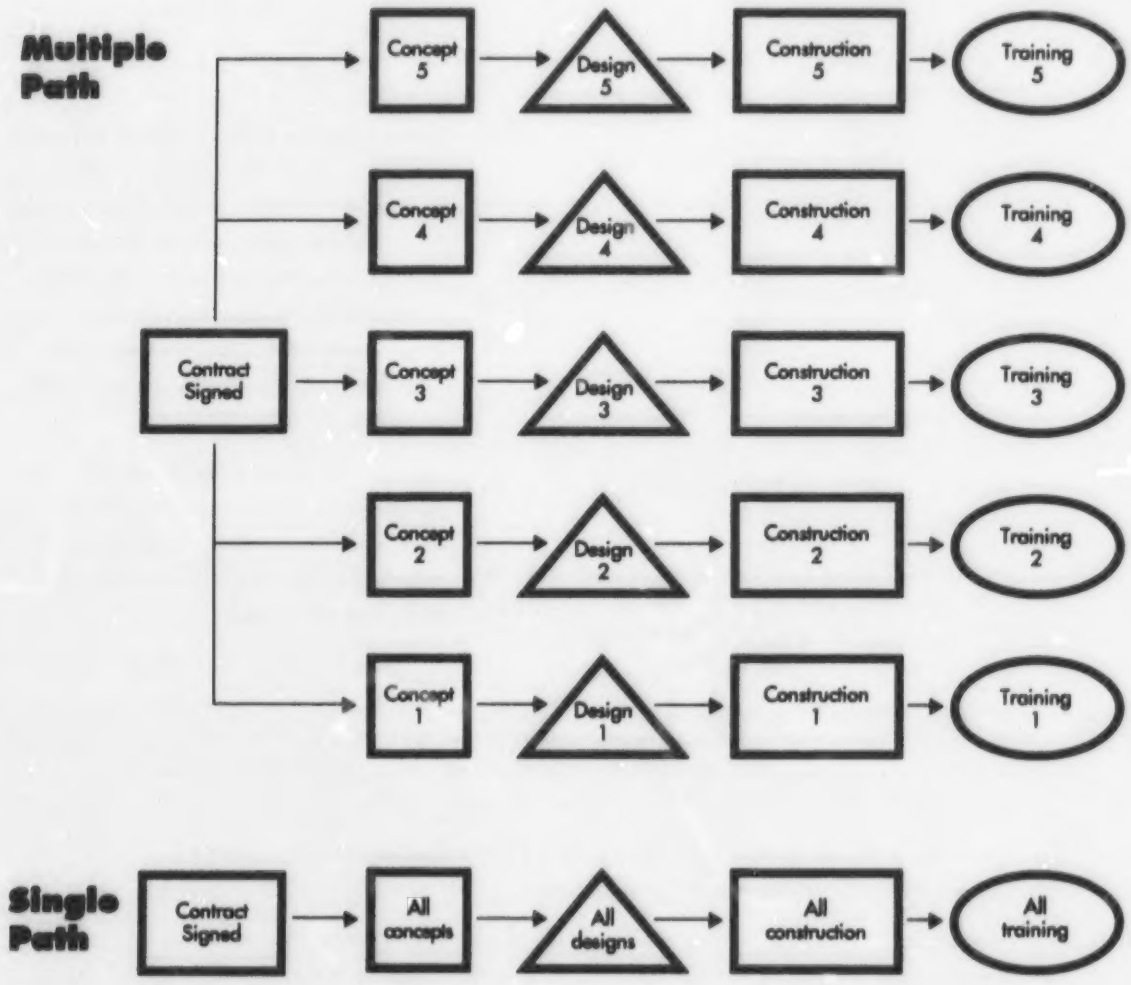
There are a variety of ways the EMF and department might agree to implement a project. Each EMF will have a different approach.

For example, some may conduct a major study encompassing all possible improvements before proceeding with any (see the Single Path Approach in Figure 5). Others may study and present measures individually, implementing them as they are approved (the Multiple Path Approach).

Though the basic approaches may start construction or savings at different points in time, they may both end at the same time.

IMPLEMENTATION TIME LINES

FIGURE 5



9.1 Concept Approval

The concept behind any improvement must be approved by the Crown before installation. The EMF will probably present the concept for approval before completing the design.

Approval of the concept is a key point for Crown involvement. It should fully discuss the implications of each concept with the EMF and building stakeholders before giving approval. If in the process of reviewing any proposed concept and it appears that a delay is likely, the Crown should identify the element of the concept that it would like changed to simplify the approval. Otherwise, approval may happen by default, through lack of response.

The concepts for each improvement are assembled into a feasibility study, for review of all concepts at one time or approval of utility-incentive grant applications.

It is important to recognize that as a result of the EMF's performance guarantee in the contract, the EMF is responsible for making wise investments. Therefore, the Crown does not need to get involved in the detail of savings or cost estimates. However, the EMF should present at least the total cost and total savings by utility type for each concept.

If the EMF presents concepts for approval individually, the Crown should verify that all concepts mentioned in the proposal are accepted, or rejected for acceptable reasons.

On the improvement cost estimate side of the payback equation, the Crown should only concern itself with the quality of the equipment to be installed. Key elements of equipment quality should be defined by the EMF in the concept, though full detail should not be expected until the final design.

The savings estimate side of the payback equation need only be presented to show the significance of any measure to the EMF. Some conservatism might be expected of the EMF in making this estimate.

The Crown should ensure that the concept is approved by occupants, operations and maintenance staff, and any central engineering staff responsible for the building. In order to expedite this approval process, all of these persons should agree to their role and the urgency of the approval process before any concepts are presented.

Each concept presentation by the EMF should cover the impact of the concept on:

- ongoing occupant comfort
- indoor air quality (see the *Health and Safety Guidelines For Energy Management Projects Under The Federal Buildings Initiative*)
- flexibility for occupant operations
- life safety systems
- the environment, due to construction activities or long-term building effluents

- the current capacity of all systems
- operating methods and the type of skill required of operating staff
- maintenance methods and the type of skill required of maintenance staff
- non-energy costs of operations and maintenance
- the life of existing equipment
- the life of proposed new equipment
- future fuelling options, should utility price structures change dramatically
- occupants and operations during construction

The concept presentation should also define:

- how close the proposed changes bring the building to the state of the art in energy efficiency. Some concepts may fall short of the ideal for practical or economic reasons.
- precisely how savings will be proven, if not by a utility meter
- maintenance undertakings of the EMF for this measure
- the training needed for the measure
- deferred maintenance which must be corrected to allow the measure to proceed, and how much of the work the EMF will do. The expected costs for the Crown should be estimated.
- procedures that will be followed to satisfy both the EMF and the Crown that the equipment is working properly
- the schedule for design and construction of the measure

The environmental specialist within your department should review the environmental impact described for each concept. An environmental impact will arise most likely where asbestos is in the building fabric or insulation, or where PCBs are in lighting ballasts or transformers.

The Crown may wish to consider minor rescheduling of the implementation of any measure to better suit occupants or other renovations being made to the building. However, such deferrals cannot be extensive without impact on the project economics. The EMF should be authorized to proceed with its plan as long as it reasonably accommodates all requirements stated in writing by the Crown before signing the contract. Delays to allow the Crown to optimize its own future renovation costs cannot be considered. For example, the rebalancing of an air handling system as part of lighting or HVAC changes cannot be deferred by the EMF until new occupant realignment in the space, simply to avoid duplicating the air balancing work.

The Crown may wish to "co-invest" with the EMF to enhance a measure so as to bring it to the state of the art or add special maintenance or operational features. Such possibilities should be discussed with the EMF before approving the concept.

The Crown may wish to piggyback on work planned by the EMF in order to optimize the Crown's own costs. Such procedure would involve the Crown supplying extra funding for the EMF to extend its improvements in whatever way specified by the Crown. For example, to accommodate a future occupant's needs in the space, the Crown may ask the EMF to include these changes as part of the design and construction of general lighting or HVAC changes, even though the occupant is not expected to move in immediately. The Crown would gain from having just one design and construction process for the space, rather than an energy refit followed by an occupant refit, and possibly a further energy refit adjustment. To fund such extra agreed work the Crown may agree to pay cash or extend the term of the contract. Any piggybacking which is funded by an extension of the term of the contract must be constrained by the maximum eight-year term allowed by the Treasury Board.

9.2 Design Approval

Following concept approval, the final design documents must be approved by the Crown. At this point, the EMF must show all equipment specifications and the installation layout. If the Crown feels it needs equipment that is more expensive than that planned by the EMF, there will be negotiation as to whether the extra cost is to be borne by savings, or whether a special contribution is required from the Crown.

The EMF should also provide an estimate of the cost of an extended warranty for any equipment to be maintained by the Crown. The Crown should determine whether it wishes a firm quotation for extended warranty on the equipment.

The Crown's interests at this point are:

- the design reflects suitable quality
- the design meets the building's operations and maintenance needs
- design documentation is adequate for the long-term records of the building

9.3 Subcontractor Approval

The Crown is interested that the EMF employ properly skilled crews to work in the building. For this purpose the Crown should approve a list of subcontractors to be considered for the work. The Crown should also ensure that subcontractors are adequately bonded to protect the Crown during the implementation period.

The Crown is also interested in ensuring that good value is obtained. However the EMF has ultimate responsibility because it guarantees to pay costs regardless of savings achieved. The EMF has also shown in its proposal the nature of any non-arm's-length arrangements with suppliers. Therefore the Crown should not expect to review final selection for each subcontractor. Since costs are openly charged to the project under the FBI model contract, the Crown can inspect the costs and determine whether it feels good value is being obtained. However the Crown has no direct control of project costs. This is the function of the EMF and not a matter for public scrutiny.

If an extended warranty quotation was requested at the final design stage for any measure, the Crown should decide whether it wishes to accept the quoted extended warranty.

9.4 Construction Schedule Approval

The EMF will schedule construction in a logical fashion to ensure that no part of the building is out of service for an undue period of time. For example, the nucleus of a computer control system must be in place before old controls are disconnected on any system and new control concepts implemented. However, the entire computer network does not need to be in place at this time, only enough to support the operation of any measure.

The Crown's concerns regarding construction scheduling are to minimize disruption of normal operations and to receive adequate notice of all activities. Though occupants will have been involved in Concept approval, they need to be informed when work will be performed on site and exactly what kind of disruption to expect in their normal occupancy. The perception by occupants of being kept in the dark about things affecting their space is a potentially damaging, long-term problem for an EPC project. Such suspicion easily arises around energy management activities because of widely held erroneous beliefs that energy projects always lead to occupant comfort problems. Every effort should be made to ensure that all occupants are aware of the neutral to possibly positive impact on their environment, and the exact timing of the construction disruption.

Depending on the number of activities going on at any time, the Crown may require weekly detailed schedule reviews with the EMF, one to two weeks in advance.

Though the skills of the EMF's team are often very valuable to the Crown for other purposes, they should not be regarded as an infinite source of help for all operating problems in the building. Often, in the course of an improvement, a building owner will perceive opportunities to achieve other minor objectives. For both the EMF and the Crown's sake, all such requests should be treated as work requisitions of a contractor, complete with special agreement about how the extra costs will be paid.

9.5 Completion of Improvements: Commencement of Payback Period

At the completion of construction of any measure, the Crown should expect:

- to witness the commissioning
- to receive a commissioning report that verifies the design intent has been met as outlined in the Concept presentation
- that all current staff have received appropriate training
- that operating and maintenance procedures are supplied in written form
- to receive "as built" design documents
- to receive all required permits and inspection reports
- to sign a statement of acceptance of the measure. Depending on the nature of the contract and the measure, this acceptance may also transfer ownership and begin Crown maintenance responsibility.

After completion of all improvements, the EMF will present a notice of its intended commencement date. The Crown must ensure that all retrofits are substantially complete, before approving the commencement date.

The FBI model contract defines the warranty period and the payback period as beginning with the commencement date.

Several conflicting interests converge at the commencement date. The main ones are summarized below.

The Crown may wish the commencement date to be:

- as early as possible, so that the contract ends and all savings revert to the Crown as soon as possible
- deferred in order to:
  - extend the length of time the Crown collects construction period savings
  - extend the period of time the EMF's equipment warranty is in effect

The EMF may wish the commencement date to be:

- as early as possible in order to:
  - begin collecting savings to pay down its investment
  - recognize construction completion for the sake of its own financial statements
  - establish permanent rather than construction-period financing vehicles
- deferred to allow more time to fine-tune the improvements before the payback period begins. This concern arises where the EMF is nervous about its savings performance.

Overall, it is usually in everyone's interest to have as early a commencement date as possible. However, rushing the work to accelerate commencement might increase project costs or decrease savings more than it is worth.

9.6 Ongoing Training

In addition to training staff on the operation of the improvements, the project may involve upgrading the knowledge of staff on operating and maintaining *all* building systems. Proper operation of existing equipment is just as important to a building's energy performance as proper operation of retrofitted equipment. Therefore, good training on all aspects of building operations and maintenance is often part of an EPC project.[1]

This training can take four forms:

a) manufacturer's general off-site training on their equipment

b) manufacturer's on-site training for building staff on their equipment

c) EMF-run training workshops to review operating and maintenance philosophies and techniques for all equipment in the building

d) regular contact between building and EMF staff. EMF visits throughout the life of the contract aim at inspecting and monitoring operations, and ensuring that staff understand proper energy-efficient methods.

The training will be supported by the manual supplied by the EMF. The manual should be more than a collection of manufacturers' operations and maintenance booklets. It should include descriptions of the intent of each system, the equipment in the system, normal settings, the specific steps to be taken by staff routinely, and suggested responses to problems.

Through the life of the contract, there may be changes made to operating methods. Some of these will be suggested by the EMF and approved by the Crown. In this case the EMF should update all copies of the manual. However, where the Crown initiates a change that is acceptable to the EMF, there must be some consideration for the EMF's effort to update the manual.

Where some systems are maintained or operated by contractors of the Crown, the manual should spell out, in stand-alone documents, exactly what is required of the contractors. The Crown must ensure that these documents are included in its O&M contracts.

[1] Where savings payments do not depend on the utility meters or ongoing performance, such all-encompassing training may not be offered since its savings impact will not be realized by the EMF. Nevertheless, the Crown may wish such training.

Training should be a continuous focus through the payback period. It is the Crown's objective to ensure that good practice has become habitual by the time the EPC contract is finished.

As operations-and-maintenance staff often change, there must be an agreement with the EMF about training new staff. The manual plays a key role in documenting the proper methods, but it cannot be presumed that reading a manual will ensure new staff learn what they may see as novel methods. Some individualized training may arise from the routine inspections made by the EMF. However, periodic refresher programs should be scheduled to help ensure both old and new staff understand proper procedures. The Crown and the EMF may share the training costs for new staff.

9.7 Maintenance

The EPC contract or the individually approved concept presentations will define what equipment the EMF wishes to maintain. Otherwise, the Crown should expect to maintain all equipment, new or old.

One example of this situation is the control system in the building. If computer control has been integrated into the system, replacing some original control equipment, it is impractical to have two contractors maintaining the combined system. Only one contractor should be used.

As a general guide, building maintenance is simplest if there is no division of responsibility between the EMF and the Crown for it. The Crown, therefore, should consider maintaining all equipment itself or turning all maintenance over to the EMF, if it is so qualified. Financial allowances may be negotiated with the EMF to support Crown costs associated with maintaining equipment added by the EMF.

However, where new systems have minimum interaction with others in the building, the EMF may cost-effectively supply all related maintenance. A cogeneration plant is one example of such a system.

Through the warranty period of the new equipment, the Crown will perform normal maintenance as established by the contract or concept presentation. However, any warranty work done on the equipment by the EMF during this period must not be charged to the project. It is important to be alert to charges made for any work associated with new equipment or system problems during the warranty period.

9.8 Maintaining Occupant Support

In order for any building modifications to be successful they must be accepted by the occupants. Silence often means acceptance. However, once the silence has been broken, the road to recovering occupant acceptance can be very difficult.

Active effort should be made to ensure that occupant acceptance is secured, rather than waiting for complaints. Once complaints begin, recovery of support is far more difficult than repair of the problem.

Occupant concerns should be addressed throughout the design and construction phase, yet as operating wrinkles are ironed out occupants need to be kept informed of the status of the project. The accommodations officer should be asked to assist with regular communication with occupants regarding the schedule and progress of the project. The FBI has prepared an Employee Awareness Package to assist in this communication. It includes suggested strategies and helpful visual aids to deliver an appropriate message to occupants. Contact an FBI manager for this material (see Section 2.0).

Even the best-managed improvement is likely to at least temporarily aggravate some occupants. Crown and EMF staff should acknowledge these whenever they arise, and inform everyone concerned about activities to make corrections. For example, lighting retrofits will occasionally be over-zealous in some areas, causing visual discomfort. Special attention to the first few complaints is warranted, in order to avoid a widespread revolt. Immediate replacement of some original lights may eat into energy savings in a small way, but ensure that the main savings are protected.

Crown staff should ensure that the EMF is fully informed of occupant concerns, and that the EMF takes particularly swift action in the early days of any improvement.

The regular savings monitoring should produce information to be shared with occupants, after some simplification. It is important that occupants recognize that their involvement with the activity is paying off.

9.9 Monitoring and Annual Reporting

The FBI model contract requires the Crown to begin payment of savings following the commencement date, near the end of construction. Once the EMF starts collecting savings, it will protect its guarantee of performance by routinely inspecting operations to identify opportunities for improvement. This monitoring is performed for both the EMF and the Crown. Both have an interest in maximizing the savings.

The key information which should be included in regular **monitoring** reports from the EMF is:

- anticipated date of retirement of debt or contract completion[3]
- savings over the last period and the last twelve months

[3] The EMF will be in difficulty if the anticipated date for debt retirement exceeds the target date or the end of the contract. In these circumstances the firm will be looking for all possible means to increase savings, while not increasing costs. The EMF may watch closely for base year adjustments or Crown irregularities worthy of notification.

- during the design and construction period extra information is appropriate to maintain awareness:
  - the list of planned or committed measures, annotated to show where the Crown has approved the concept, the design, and the measure completion
  - the expected date for completion of all measures
  - the annual savings target based on the latest analysis
- extra invoices in the last period for services not required by the EMF
- outlines of notices of irregularity submitted during the period
- outlines of base year adjustments submitted during the period
- current interest rate on financing in place, as well as the number of months remaining in the term of any current loan from an outside financing source
- changes to EMF project team members (see Section 11.3)

With the full-cost disclosure format of the FBI model EPC contract, the EMF is required to routinely show its costs in appropriate detail. Such detail should show at least the cost of materials and installation for each measure, engineering time, and project management time. In addition, markups and interest should be shown separately. These cost statements should be included with the monthly **savings invoice** and a statement showing the outstanding project balance.

The frequency of monitoring reports from the EMF depends on the stage of the project. During the design and construction period, monthly reporting would be appropriate. During the first two years after construction, quarterly reporting is needed. Thereafter, a minimum of semi-annual reporting would be adequate in most cases.

From EMF reports, summary reports should be routinely prepared for department management in order to maintain their support. These reports should include the total annual savings rate that will be taken over by the Crown on contract completion. Anecdotal evidence of the impact on building operations, staff moral, and occupant reactions should also be shared with management.

Annual Reports to Natural Resources Canada are also required. The form of these reports is included in the FBI model contract. This form should be completed by the EMF.

9.10 Project Payout

The FBI model contract defines the end of the contract as the point in time where the project balance is fully paid from savings. At the time of payout, it is important to obtain from the EMF any documents or materials that will be used in the Crown's subsequent

management of the facility. A computer-readable version of the text in the manual should be obtained from the EMF so the manual can be kept up-to-date.

If it is not in the manual, a list should be obtained of any maintenance parts regularly purchased by the EMF if it was performing maintenance tasks. This list can be used to ensure that future maintenance uses compatible parts.

10.0 SPECIAL EVENTS

Throughout the life of an EPC Contract there are a number of special events deserving Crown attention.

10.1 Notice Of Irregularity

Notices of irregularity, as they are termed in the FBI model contract, are indications that the EMF believes that something beyond its control is interfering with savings. As both the EMF and the Crown have an interest in producing savings, such notices should be seen as helpful in protecting the savings stream. The mere submission of a notice may be intimidating to representatives of the Crown. However, they should be recognized as appropriate means for the EMF to record any concerns it has. Presumably, they are merely written confirmations of recent discussions about concerns.

10.2 Base Year Adjustments

At any time in the life of the contract, the EMF may determine that the Crown has modified conditions from those that existed in the base year. Such modifications may range from the addition of personal computers for occupants to a major addition to the building. They may also involve the extension of occupancy periods. Such factors erode the basis for savings agreed upon in the contract and are therefore valid adjustments. They usually involve some engineering estimate of the energy impact of the perceived change.

The Crown needs to satisfy itself that the change happened as suggested, and that the engineering calculations are reasonable. An engineer for the Crown should examine the calculations.

The EMF may be less diligent in seeking reductions to the base year. The Crown may need to alert them to factors reducing energy in a permanent way. However, the EMF should produce a computation of any such reduction when requested.

Any large building usually undergoes a number of changes each year which might be the subject of a base year adjustment. As each adjustment takes some effort to develop and evaluate, it is usually wise to batch several together and consider them all at one time, on an annual basis. Nevertheless, as the Crown does not want any cash flow shocks, it should encourage presentation of any significant adjustment as soon as it is recognized as necessary.

10.3 Concept Changes

Following approval of the concept for any improvement, some details may reveal that a change is needed to the concept. Such changes may arise even after construction. The EMF should present such concept changes immediately for approval, and reflect them in all documentation, including the project operations and maintenance manual.

10.4 Design Changes

Following approval of the design, some details may need to be changed, though the concept remains intact. Such design changes should be presented for Crown approval immediately and reflected in all documentation, including the operations and maintenance manual.

10.5 New Measures After Commencement

Often, after completion of all planned measures, a new improvement or technology idea arises. While the EMF's technical expertise is on the job, and presuming the financing vehicle can accommodate an additional investment, such opportunities should be pursued. Of course, recovery of its cost must fit within the remaining term of the EPC contract, or some negotiated extension thereto.

10.6 Project Cost Payout

Under the FBI model contract, retirement of the project balance ends the contract. As a project nears successful payout, the EMF naturally reduces its attention since its risk has declined. However, concern for cost control also declines as the certainty of full cost

recovery increases. This certainty may set in any time within two years of the projected payout date. The Crown should ensure at this stage, if the project is going well, that the services supplied by the EMF are not excessive to the needs of the project.

10.7 Utility Price Fluctuations

The FBI model contract protects the EMF's investment against a drop in utility prices. This is needed as the EMF has much at stake in such a situation, whereas the Crown would benefit from the price drop. The contract terms are designed to protect the EMF using part of the Crown's windfall from a price drop.

If prices go up, the model contract allows the EMF to collect more for its energy savings, while the Crown is paying more for its energy. This accelerated collection will retire the debt more quickly and allow the Crown to take over the major savings stream more quickly. The increased value for savings poses no greater cost for the Crown than if there had been no retrofits.

10.8 Interest Rate Fluctuations

The FBI model contract allows for adjustments if costs change beyond EMF control. Interest rate fluctuations often trigger this feature, as rates at the time of contract signing cannot always be held firm throughout the construction and payback periods. The protection for the EMF against interest rate fluctuations extends the contract term to cover interest rate impacts, up to the maximum eight years allowed by the Treasury Board.

The impact of interest rate fluctuations can be partially managed by EMF decisions about financing terms and dates. The Crown should review the financing rate shown in the monitoring reports suggested in Section 9.9. Though the Crown may not be able to set the financing rate, it can suggest appropriate refinancing strategies.

11.0 ISSUES

Some common issues that arise as building owners get involved with EPC are discussed below.

11.1 Who's In Charge Of Building Operations?

With an EMF involved in defining operating strategies, many operators feel a loss of control. However, most EMFs do not want to run the facility. They expect the current staff to run it. The EMFs role is to propose better ways to run the building. If the EMF cannot persuade the staff to approve the improvement concept, the change has no place in the building. This is why operations staff need to be involved in reviewing the concepts (see Section 9.1).

Once an improvement is in place, it may be found to produce unpalatable results, even though the energy objectives are met. Such results may be in the form of space conditions beyond the levels described in the contract – clearly a contract violation. However, if the objectionable impact of the improvement involves operations or maintenance cost increases beyond those suggested in the concept (Section 9.1), the Crown may express its displeasure or negotiate remuneration.

11.2 Crown Management Staff

The Crown must appoint a person to act as project manager. This person should handle all official reports and documents, as well as involve the appropriate individuals from the building or department in any particular issue that may arise (see Section 5.5).

The Crown's project manager must take an active interest in the project and have the necessary authority to make the decisions needed by the Crown. Without ready access to the decision maker, the contract may experience delays, adding to project costs in the form of interest, unrealized savings, and labour.

Though the EMF is hired to handle all aspects of the project, it is not given a free hand to do what it wants. The Crown's rights of approval are vital to protecting its interests. They should not be taken lightly.

Nevertheless, as the EMF was selected as a trusted partner for a long-term relationship, it should be left to handle its own affairs. A relationship of mutual trust, which follows the defined areas for interaction, will produce a more effective result than one filled with constant review of matters that are the EMF's responsibility.

11.3 Changing Faces

Over the life of a long-term contract there are bound to be changes in personnel on both the Crown's team and the EMF's team. Such events can lead to a loss of enthusiasm, or simple ignorance of the original objectives.

New Crown staff may not realize what changes were made by the EMF before their employment. All they may see at this point is relatively large payments made to the EMF. New staff, whether senior or junior, need to be informed of the project history, current benefits, and the future full savings stream that will benefit the Crown.

New staff at the EMF's office need to meet and appreciate the skills and understanding of all staff in the building.

As much of the success of an EPC project depends on a good relationship between the owner and the EMF, whenever there is a change in personnel, some time must be reinvested in building a new relationship.

11.4 Whose Savings?

A common misunderstanding is that as long as all savings are paid to an EMF, there is little reason for building staff to even think about ways to generate further savings, let alone take any action to increase savings. However, under the FBI model contract, any increase in savings will retire the EMF's investment more quickly and give the Crown access to the savings at an earlier date. Though this is a future benefit, it has a present value. Larger savings will not increase the EMF's profit under the model contract. However, they will reduce the EMF's risk of incomplete payout within the contract term.

By immediately implementing ideas to increase savings, rather than waiting for the EMF to depart, staff creativity is encouraged and will probably carry on for years to come. The EMF can assist in finalizing ideas and provide positive support.

In normal- to full-cost disclosure type projects, the Crown and the EMF should look on each other as allies in achieving common goals. There is no advantage for the Crown to keep savings ideas away from the light of day.

11.5 "Weather Normalized Savings" And A Mild Winter

Just when you think you understand how savings are adjusted for weather, the EMF may explain that savings dropped this year because of a mild winter! Now you are really confused.

This situation arises when everything is working normally. The confusion arises because weather adjustments are made relative to the weather of the base year, rather than to the weather of an average year.

Suppose efficiency improvements make a heating system use 20% less fuel than before, when it is running. Suppose further that the heating season is shorter than normal. There is less opportunity to make the savings, so savings cannot be as great as in a normal year.

This is a reality that all EMFs live with, hoping that over a long-term contract, the average conditions will come close to the normal that they projected. The only serious risk for the EMF in this regard is if the savings projection was based on the heating load of a cold year rather than that of a normal year.

This situation needs to be understood by the Crown, but is not a basis for any EMF special claim against the Crown.

11.6 Equipment Breakdown

When there is a breakdown of equipment that the EMF installed or influenced in any way, the EMF is immediately implicated. Clear lines of responsibility need to be established for responding to repair calls (see Section 9.7). Except where the EMF is also the service contractor, the Crown must call its service staff or contractor.

If the equipment is still under EMF warranty, then the EMF is involved. The method of reaching the EMF in an emergency situation should be clearly defined. The EMF may hire its installing subcontractor to handle service calls during the warranty period.

A further implication of an equipment breakdown is that related systems may be unable to operate or earn their savings during the breakdown period. As mentioned under "Weather Normalized Savings" above, this situation will frustrate an EMF's anticipated savings. Unlike weather variations from normal, this breakdown savings loss will become a basis for an estimated savings claim from the EMF. Care must be taken to separate the frustrated savings claim from any reduction or increase in energy that may have occurred during the outage. The savings invoice for this period warrants careful scrutiny by an engineer for the Crown.

11.7 Estimated Savings Invoices

Savings invoices may be based on estimates because of interruptions to the regular flow of copies of utility bills to the EMF. Estimates may also be used where small utility accounts do not warrant monthly review.

Such estimates should be reconciled to actual amounts at least annually. It is important that reconciliations do not create large invoices or credits. The department's budget may not be able to accept a significant belated extra invoice. Similarly a credit or cheque returning excess funds may create budget difficulties for the department. Therefore the EMF should be encouraged to make reconciliations frequently enough to avoid large amounts, and to synchronize them with Crown fiscal years.

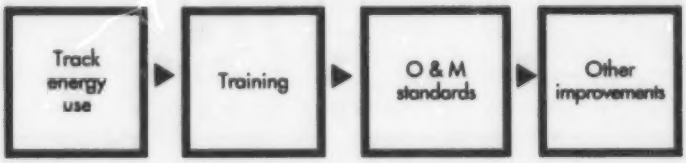
11.8 Accounting Savings vs. Real Savings

In reviewing the first few savings invoices derived from utility records, someone in the accounting office of the department is likely to check the claimed savings against utility costs paid. The weather and other adjustments made by the EMF will be foreign to accountants and may cause them to question invoices. The EMF may help with the explanations. The key concept to bear in mind is that the invoices are for "avoided costs." In other words, if the building had not been modified, the utility costs would have been higher by the amount of the avoided costs, called the savings.

It is important when reviewing savings calculations from utility records to realize that the calculation process is far from being standardized in the industry. Though the accuracy of the metering may be better than 1%, the accuracy of adjustments for governing factors is generally much poorer. Adjustments for factors such as the weather and operating mode of the building are usually derived from minimal empirical data and subject to engineering judgement. As a result, it should be recognized that "savings" are defined as the results of an agreed calculation process outlined in the contract. There is rarely absolute proof for savings. Therefore accountants who may wish to challenge the process should recognize that the cost avoidance calculation methodology is defined in the contract.

12.0 MAINTAINING THE SAVINGS AFTER THE EPC PROJECT IS FINISHED

After completion of an EPC project it is important to continue the operating methods and management procedures used during the contract. Otherwise there is a serious risk of the savings eroding with time.



12.1 Energy Tracking

The first step is to implement an energy tracking system similar to that of the EMF. The EMF may be able to offer such stand alone service or advise where to obtain similar software or service.

Savings reports for the first year after the project should compare current energy use to that of the last year of the project. In this way, it is possible to identify any changes from the project's low consumption level.

Every two years, the reference year should be updated to ensure that comparison is always done with a recent past year. The operating procedures of a recent reference year can be remembered clearly, facilitating analysis of any departure from the patterns of the reference year.

12.2 Training

The manual must be kept up-to-date as changes are made.

Periodic refresher training needs to be continued for both new and long-standing staff members. However, now that technical expertise is no longer readily available, conscious effort and money must be expended to keep staff in touch with technology and wisdom in the field. Staff should be sent to training courses offered through colleges or by manufacturers.

12.3 O & M Standards

The end of the EPC project should not bring about any change in operating and maintenance procedures. The procedures in the manual should still be followed.

12.4 Deferred Items

At the time of implementing the EMF's measures, some ideas may have been deferred because of their impact on occupants or other building repairs. When the savings are retained by the Crown after EPC project payout, the Crown may be able to pay for new measures very rapidly with the full savings stream.

The original preliminary audit and initially proposed Concepts should be reviewed to identify any ideas which were shelved at the time. They may be more appropriate at this time.

12.5 Retaining Expert Help

The expertise needed for the above tasks may be obtained from the EMF on conventional terms. Alternatively, another independent energy expert may be used, though this individual will have to gain familiarity with the building and its operating methods.

APPENDIX 1

BUILDING CHARACTERISTICS

Building Name _____

Location _____ Number of Floors Above Grade _____ Below _____

Gross Conditioned Area _____ sq. ft.
All floor area contained within the outside finished surface of permanent outer building walls, including basements, mechanical equipment floors and penthouses (ANSI Standard Z65.1-1980, "Construction Area"). No exclusions are made for shafts, stairs, or atria. Conditioned area is that area provided with heating or cooling to maintain temperature between 50°F and 86°F (ANSI/ASHRAE Standard 105-1984 (RA90)).

Year of Construction for at least 51% of area _____

Building Type (Show approximate % of area by major Type. No Type <25% of total area.)

___Office
___Accommodation - Bachelor
___Accommodation - Single Family
___Accommodation - Multi-Family
___Hotel
___Primary School
___Secondary School
___University
___Multi-Building Campus
___Food Service - Mass cooked
___Food Service - Individually cooked
___Nursing Home
___Psychiatric Hospital
___Clinic
___Active Treatment Hospital
___Detention
___Greenhouse
___Supermarket
___General Merchandise
___Conditioned Parking Garage
___Vehicle Service Garage
___Aircraft Hangar
___Lab
___Manufacturing - Describe_____
___Warehouse - non refrigerated
___Warehouse - refrigerated
___Airport Terminal
___Railway Terminal
___Marine Terminal
___Museum/Gallery
___Ice Arena
___Arena - no ice
___Other Assembly - Describe_____
___Other _____

Occupancy Period _____ Average Hours/week _____ Average Weeks/year
(Occupancy for at least 51% of the space)

Average Number of Occupants During Occupancy Period _____

Utility Types (Name utilities serving more than 5% of the following end uses)

Heating _____
Air Conditioning _____
Domestic Hot Water _____
Kitchen _____
Laundry _____
Other Processes _____

Special Loads (e.g., Pool Indoor/Outdoor, Computer Centre):

CURRENT ENERGY USE

APPENDIX 2

METERED CONSUMPTION AND DEMAND

Building _____

Utility Type _____

Utility Account Number _____

Utility Company _____

Utility Rate Schedule Number _____

Metering Period		Consumption	Electricity Only		Cost
From D/M/Yr	To D/M/Yr	Units _____ *	Measured Demand (If On Bill) Units: kW__ kVA__	Billed Demand (kW)	($)
		Total	Avg	Avg	Total

* *Enter units of measure, e.g., kWh, m³, MCF, therms, gal., etc.*

APPENDIX 2

CURRENT ENERGY USE

DELIVERED FUEL

Building _____

Tank Location _____

Utility Account Number _____ _____

Price of Last Delivery $ _____/unit (P)

	Delivery Date D/M/Yr	Delivery Amount	Total Cost ($)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Use of inventory	(I)	(C)
Total annual use		

Energy Type

___ No. 1 Oil
___ No. 2 Oil
___ No. 4 Oil
___ No. 5L Oil
___ No. 6 Oil
___ Propane

___ Coal – Type _____
___ Other – Define ____

Units

___ Litres
___ Imp. Gallons
___ US Gallons
___ Tons
___ Other (define)

Inventory:

At Date 0: _____ (A)
365 Days After Date 0: _____ (B)
Use Of Inventory (A-B): _____ (I)
Cost of Inventory Used
= (I) x (P): _____ (C)

APPENDIX 2

CURRENT ENERGY USE
SUMMARY

Building _____ Area (sq. ft.) _____(A)

Period from _____ To _____

Energy Type	Total Annual Use (365 days)	Units	Conversion factor to ekWh	Annual ekWh (365 days)	Total Annual Cost
Electricity consumption					$
Natural gas					$
Oil # ____					$
Steam					$
Hot water					$
Propane					$
Coal					$
Chilled water					$
Other____					$
					$
			Total	(E)	(C)

Average of twelve months' peak electrical demands (kW) _____(D)
Annual Water Consumption (kGal) _____(W)

Energy index (E/A) _____ekWh/sq. ft./yr
Demand index (D x 1,000/A) _____Watts/sq. ft.
Energy cost index (C/A) _____$/sq. ft./yr
Water index (W/A) _____kGal/sq. ft./yr

Conversion multipliers to equivalent kilowatthours (ekWh)		
Natural gas (1,000 BTU/cu. ft.)	MCF	302.0
	Cubic metres	10.7
#2 oil	Litres	10.8
	Imp. gallons	48.9
#6 oil	Litres	11.9
	Imp. gallons	54.2
Propane	Litres	7.09
	Imp. gallons	32.2
Steam (no condensate)	1,000 lbs	293.0

APPENDIX 3

COMPONENTS OF ANNUAL ENERGY USE

Building _____

	Electric demand kW Avg	Electricity kWh	Fuel ekWh	Other ekWh	Total ekWh	Total Cost $	% of Total Cost
Space heating							
Space cooling							
Fans							
Pumps							
DHW generation							
Lighting in space							
Lighting outside conditioned space							
Receptacles							
Kitchen							
Laundry							
Lab equipment							
Conveyance							
Other _____							
Unaccounted							
Total	Avg					$	100%

APPENDIX 4

SUMMARY OF ANNUAL ENERGY SAVINGS POTENTIAL

Building _____

	Electric demand Index (Watts/sq. ft.)	Electricity Indices (ekWh/sq. ft./yr)			Cost Indices ($/sq. ft./yr)			Total Annual Cost $
		Electricity	Fuel	Total	Elec.	Fuel	Water	
Current annual use (C)								
Budget annual use (B)								
Savings potential (C-B)								